

CLAIMS

1. An antenna device comprising:
  - a substantially circular substrate;
  - a substantially circular microstrip patch provided on the upper surface of the substrate; and
  - a substantially cylindrical conductive member having upper and lower opening portions erected in a substantially vertical direction around the microstrip patch,wherein the lower opening portion of the conductive member is grounded to a ground plate provided on the lower side of the substrate, and  
wherein the diameter of the upper opening portion of the conductive member is larger than the diameter of the lower opening portion of the conductive member.
2. An antenna device as claimed in claim 1, wherein, to a wavelength of a signal wave serving as an object of an antenna device, the height of the conductive member is from about  $1/3$  a wavelength to about  $1/2$  a wavelength.
3. An antenna device as claimed in claim 1, wherein, to a wavelength of a signal wave serving as an object of an antenna device, the height of the conductive member is about  $1/3$  a wavelength, the diameter of the substrate is from about  $3/4$  a wavelength to about  $5/4$  a wavelength, and the diameter of the upper opening portion of the conductive

member is from about  $\frac{13}{12}$  a wavelength to about  $\frac{11}{6}$  a wavelength.

4. An antenna device as claimed in claim 1, wherein, to a wavelength of a signal wave serving as an object of an antenna device, the height of the conductive member is about  $\frac{1}{3}$  a wavelength, the diameter of the substrate is about a wavelength, and the diameter of the upper opening portion of the conductive member is about  $\frac{3}{2}$  a wavelength.

5. An antenna device as claimed in any one of claims 1 to 4, wherein the substrate is made up of a honeycomb material.

6. An antenna device as claimed in any one of claims 1 to 5, wherein a parasitic microstrip patch is provided in the front of the radiation surface of the microstrip patch.

7. An antenna device as claimed in any one of claims 1 to 6, wherein the conductive member can be freely changed.